International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 8; Issue 06 (E); June 2019; Page No.19299-19302
DOI: http://dx.doi.org/10.24327/ijcar.2019.19302.3716

Research Article

TO STUDY THE SPECTRUM OF HAEMATOLOGICAL DISEASES IN PATIENTS WITH INCREASED RDW

Kuldeep singh, Arnav Roychoudhury*, Vijay Suri, Nidhi Bansal, Gunjan Bala and Shaffy

Department of Pathology Adesh Institute of Medical Sciences and Research, Bathinda, Punjab

A R T I C L E I N F O

Article History:
Received 15th March, 2019
Received in revised form 7th April, 2019
Accepted 13th May, 2019
Published online 28th June, 2019

Key words:

RDW, haematological, megaloblastic

A B S T R A C T

Introduction: The present study was undertaken to evaluate spectrum of haematological diseases in patients with increased RDW. Aims & objectives: This study was aimed to evaluate spectrum of Haematological diseases in patients with increased red blood cell distribution width (RDW).

Materials & Methods: The present cross sectional study was conducted in the hematology section of Central Clinical Laboratory Department of Pathology, Adesh Institute of Medical Sciences (AIMSR), Bathinda, from January 2017 to December 2017. Patients with increased red blood cell distribution width confirmed by haematological report were The mean RDW-SD levels were noted as 66.01±11.18, the mean RDW-CV levels were noted as 17.32±4.06 and the mean MCV was 82.47±13.99. **Observations and results:** Iron deficiency anaemia was the common haematological diagnosis noted in 52.75% of the patients followed by megaloblastic anaemia (21.13%). 50.25% of the patients were males and 49.75% were females with male to female ratio of 1.01:1. **Conclusion:** The mean RDW-SD levels were noted as 66.01±11.18, the mean RDW-CV levels were noted as 17.32±4.06 and the mean MCV was 82.47±13.99. Iron deficiency anaemia was the common haematological diagnosis noted in 52.75% of the patients followed by megaloblastic anaemia (21.13%).

INTRODUCTION

Red blood cell distribution width (RDW) is the coefficient of variation of the mean corpuscular volume (MCV). RDW can be reported statistically as coefficient of variation (CV) and/or standard deviation (SD); RDW-CV and/or RDW-SD respectively.[1,2] Depending on the types of hematology analyzer instruments, RDW is calculated by dividing the standard deviation of mean cell volume (MCV) by the MCV and multiplied by 100 and yields RDW percentage.[1-3] It is routinely assessed as part of the complete blood count (CBC) to gather information on the heterogeneity in the size of circulating erythrocytes. Higher RDW values reflect greater variation in MCV (anisocytosis), which is usually caused by perturbation in erythrocyte maturation or degradation because of its responsiveness to subtle nutrient deficiency. RDW is used as an auxiliary index to help diagnose different types of anemia.[3-5]

From a National Health and Nutrition Examination Survey III study, the upper and lower limits of the RDW values were set at the 5th (11.0%) and 95th (14.0%) percentiles in a population.[6] The RDW is used as an auxiliary index to help diagnose different types of anemia.[5]

Corresponding author:* **Arnav Roychoudhury
Department of Pathology Adesh Institute of Medical Sciences and Research, Bathinda, Punjab

In hemolytic anemia and some other hematological diseases, because of the release of immature red blood cells into the blood stream, RDW would increase.[7] Early indication of iron deficiency appears, when RDW value increases than the decline of mean corpuscular volume (MCV). Iron studies may still be normal. When iron therapy is given, RDW would elevate first and then gradually reduce to the normal level. Many researchers suggested that RDW was closely related to the mortality in cardiovascular events such as acute coronary syndrome, ischaemic cerebrovascular disease, peripheral vascular disease, atrial fibrillation (AF), heart failure (HF) and hypertension.[5] RDW can be made as a predictor of mortality in patients with cancer, chronic lung disease or acute renal failure.[8]

It is only used clinically for diagnosis of anemia. The links between increased RDW and negative health outcomes could provide clues to improve prognosis in those with high RDW who are not anemic, particularly in elderly people.[8]

Iron or folate deficiencies,[9] are the established clinical causes of increased RDW. Various mechanisms for increased RDW also include impaired erythropoiesis (the generation of new RBC) perhaps due to effects of inflammation or senescence of erythropoietic cells in the bone marrow along with variation in RBC survival.[10] Recent evidence suggests that, elevated RDW is associated with sarcopenia, particularly in people who are overweight and obese persons.[11] Increased RDW may also

convey an important information of short and long term prognosis. The value of RDW is now being regarded as a short and independent risk for death in the general population.[12]
An increased RDW shows a profound deregulation of red cell homeostasis involving both impaired erythropoeisis and abnormal red blood cell survival, which may be attributed to a variety of underlying metabolic abnormalities such as shortening of telomere length, oxidative stress, inflammation, poor nutritional status, dyslipidemia, hypertension, erythrocyte fragmentation and alteration of erythropoietin function.[12]

Aims and Objectives

This study was aimed to evaluate spectrum of Haematological diseases in patients with increased red blood cell distribution width (RDW).

MATERIAL AND METHODS

The present cross sectional study was conducted in the hematology section of Central Clinical Laboratory Department of Pathology, Adesh Institute of Medical Sciences (AIMSR), Bathinda, from January 2017 to December 2017. Patients with increased red blood cell distribution width confirmed by haematological report were studied. Ethical Clearance was obtained for the study from the Institutional Ethics Committee, Adesh Institute of Medical Sciences (AIMSR), Bathinda.

Since the present study was time bound study, all the patients with increased red blood cell distribution width confirmed by hematological report were enrolled. A total of 400 patients had increased red blood cell distribution and were enrolled. Patients of all age groups and sex with increased RDW for the respective age group and sex were included in the study. Patients with decreased or normal RDW and those who were not willing to participate in the study were excluded from this study.

Patients fulfilling the selection criteria were explained about the nature of the study and a written informed consent was obtained (Annexure I) prior to the enrolment.

Blood Sample and Data Collection

Blood samples were collected in haematology section of central laboratory of Adesh Hospital. Samples were collected through venipuncture, drawing the blood into a test tube containing an anticoagulant (EDTA) to prevent it from clotting. Two ml of blood was used in BD (Becton Dickinson) vacutainer. All samples were run for complete blood count on automated cell counter 5 part differential Mindray BC-5380. Sample were run on the counter and reports having increased RDW were segregated before delivery to the patients. At the time of handing over the report to the patient, complete clinical and investigative performa was filled up.

On the basis of clinical findings and investigations, provisional diagnosis was recorded in a clinical performa sheet. Relevant other investigations for confirmation of systemic diseases were also performed and final diagnosis was made after necessary investigations. Selective patients were also followed up.

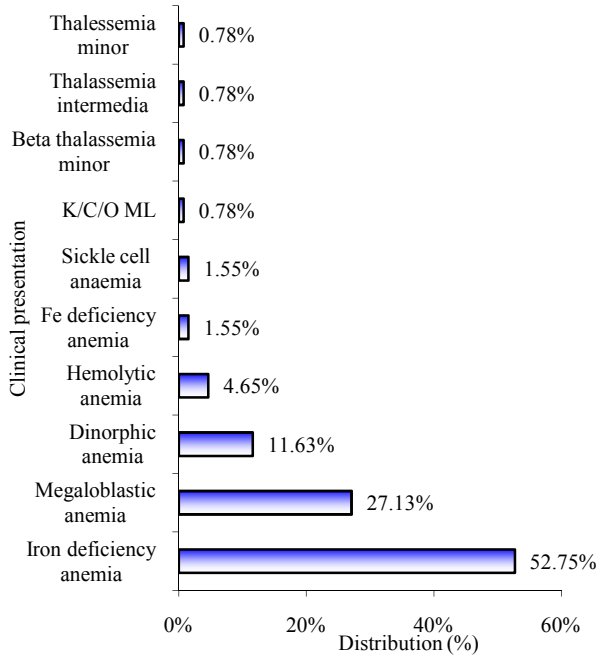
RESULTS AND OBSERVATIONS

This one year cross-sectional study was conducted from January 2017 to December 2017. Patient referred to the haematological investigations in the section of Central Clinical Laboratory, Adesh Institute of Medical Sciences and Research, Bathinda (Punjab) were evaluated for the underlying diseases. The data obtained was tabulated and analysed and the final results and observations were tabulated and interpreted as below in table no 1 and graph 1.

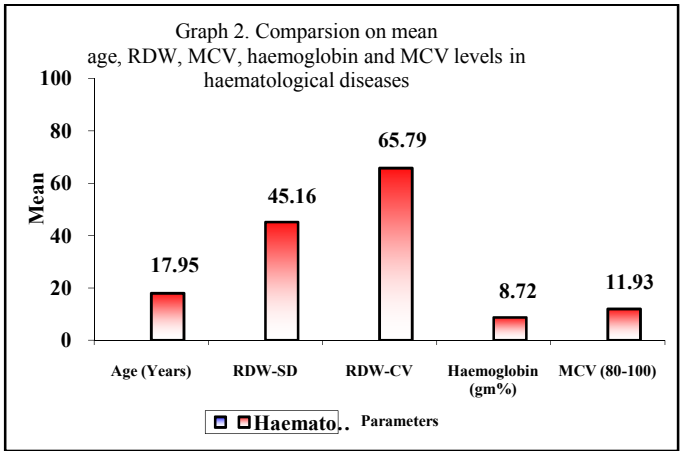
Table 1 Distribution of the patients according to the haematological diseases

Haematological diseases	Distribution (n=129)	
	Number	Percentage
Iron deficiency anemia	67	52.75
Megaloblastic anemia	35	27.13
Dimorphic anemia	15	11.63
Hemolytic anemia	6	4.65
Sickle cell anemia	2	1.55
K/C/O CML	1	0.78
Beta thalassemia minor	1	0.78
Thalassemia intermedia	1	0.78
Thalessemia minor	1	0.78
Total	**129**	**100.00**

Graph 1. Distribution of patients according to the haematological diseases



The distribution of patients according to the haematological diagnosis is as shown in Table 1 and graph 1. Iron deficiency anaemia was the common haematological diagnosis noted in 52.75% of the patients followed by megaloblastic anaemia (21.13%). Comparison on mean age, RDW, MCV, Hb levels among hematological diseases are being shown in graph no. 2 as below.



DISCUSSION

RDW is typically used in combination with the mean corpuscular volume to evaluate the cause of an underlying anemia. RDW has been used as diagnostic or prognostic marker in some of the clinical studies.

It is however still unclear whether erythrocytes may be the cause, or a simple epiphenomenon of an underlying disease, such as impaired renal function, inflammation, oxidative damage, undernutrition, or perhaps an element of both.[17]

RDW is an easy inexpensive, routinely reported test, whose assessment allows the acquisition of significant diagnostic and prognostic information in patients.[17] Considering these facts, the present study was done so as to evaluate spectrum of haematological and non haematological diseases in patients who presented with increased RDW.

One year cross-sectional study was done from January 2017 to December 2017. Patients referred to the haematological investigations in the section of Central Clinical Laboratory, Adesh Institute of Medical Sciences and Research, Bathinda (Punjab) were evaluated for the underlying diseases.

In the present study the RDW SD levels ranged from 43 to 183 fL and the mean RDW SD levels were 66.01±11.18 fL and median levels were noted as 63 fL. The RDW CV levels ranged between 12 to 57 percent and mean RDW CV levels were 17.32±4.06 percent and median levels were 16 percent. The MCV levels ranged between 57 to 130 fL and mean MCV was noted as 82.47±13.99 and median MCV levels were 78. These findings suggested that, the RDW SD and RDW CV were higher than the normal reference range. Also there was variation in MCV levels.

Increased RDW did not show any sex predilection with males (50.25%) and females (49.75%) (male to female ratio of 1.01:1). Borne Y *et al*[14] in his study did not show any significant sex difference with the patients having malignancies. However in one of the study by Chen *et al*[13] showed statistically significant male preponderance.

In our study, the age ranged between 5 months to 90 years. Most of the patients were aged between 51 to 60 years (20.5%). The mean age was 44.78±18.31 years and the median age was 45.50 years. Our observations are in concordance with study of Braun *et al*[16] in which his patients were 60 years or above. Lippi *et al*[15] showed increased RDW with advancing age. His study showed 11% higher RDW in subjects aged 60 years or older compared to those aged less then 60 years.

Among haematological diseases, most common diagnosis was iron deficiency anaemia (16.75%) followed by megaloblastic anaemia (8.75%) and dimorphic anemia (3.75%). It is difficult to discuss entire disease pattern due to the diversity of the underlying etiology. The common diagnosis of iron deficiency anaemia (IDA) noted in the present study can be explained by the fact that, the RDW is used as an auxiliary index to help to diagnose different types of anaemia.[3,4] Furthermore, an increased RDW mirrors a profound deregulation of erythrocyte homeostasis involving both impaired erythropoeisis and abnormal red blood cell survival, which may be attributed to a variety of underlying metabolic abnormalities such as shortening of telomere length, oxidative stress, inflammation, poor nutritional status, dyslipidemia, hypertension, erythrocyte fragmentation and alteration of erythropoietin function.[20]

The various forms of anemia are classified according to the MCV value, as microcytic (decreased MCV), normocytic (normal MCV) or macrocytic (increased MCV). Normal values of MCV in our auto-analyser are 80 to 100 fL. Low MCV and high RDW are one of the important differentiating feature between IDA and Thalassemia. One of our patient diagnosed Thalassemia intermedia was having RDW-SD value of 60 fL and RDW-CV value of 14%.

The combination of MCV and RDW allows a further sub-classification.[18,19] As a general rule, anemias caused by nutritional deficiencies (such as iron, folate or vitamin B12) tend to be associated with a greater degree of anisocytosis than those caused by genetic defects or primary bone marrow disorders. Although this classification seems helpful to investigate the underlying cause of anemia, potential overlaps exist among the different conditions, particularly with regard to anemia of chronic disease.

SUMMARY AND CONCLUSION

The present study was undertaken to evaluate spectrum of haematological diseases in patients with increased RDW.

The present one year cross-sectional study was performed on patients referred to the haematological investigations in tertiary care hospital of Adesh Institute of Medical Sciences and Research, Bathinda (Punjab). These patients were evaluated for the underlying diseases. The salient findings of the study are summarized as below.

- The mean RDW-SD levels were noted as 66.01±11.18, the mean RDW-CV levels were noted as 17.32±4.06 and the mean MCV was 82.47±13.99.
- 50.25% of the patients were males and 49.75% were females with male to female ratio of 1.01:1, hence no relationship between RDW and gender is noted.

Iron deficiency anaemia was the common haematological diagnosis noted in 52.75% of the patients followed by megaloblastic anaemia (21.13%)

References

1. Bain BJ. Bates I, Laffen M, Lewis SM. Dacie and Lewis Practical Haematology. 11th ed., Philadelphia, PA: Churchchill Livingstone/ Elsevier; 2012.
2. Harmening DM. Clinical Hematology and Fundamentals of Hemostasis. 5th ed., Philadelphia, PA: F.A Davis Company; 2009.

3. Sategna GC, Scaglione N, Martini S. Red cell distribution width as a marker of coeliac disease: a prospective study. Eur J Gastroenterol Hepatol 2002;14:177-81.
4. Li N, Zhou H, Tang Q. Red Blood Cell Distribution Width: A Novel Predictive Indicator for Cardiovascular and Cerebrovascular Diseases. Dis Markers. 2017;2017:7089493.
5. Patel KV, Ferrucci L, Ershler WB, Longo DL, Guralnik JM. Red blood cell distribution width and the risk of death in middle-aged and older adults. Arch Intern Med 2009;169(5):515-23.
6. Emans ME, Gaillard CA, Pfister R, Tanck MW, Boekholdt SM, Wareham NJ, *et al*. Red cell distribution width is associated with physical inactivity and heart failure, independent of established risk factors, inflammation or iron metabolism; the EPIC—Norfolk study. Int J Cardiol 2013;13(4): 3550-5.
7. Sousa R, Gonçalves C, Guerra IC, Costa E, Fernandez A, do Bom Sucesso M, *et al*. Increased red cell distribution width in fanconi Anemia: a novel marker of stress erythropoiesis. Orphanet J Rare Dis 2016;11:102.
8. Pilling LC, Atkins JL, Duff MO, Beaumont RN, Jones SE, Tyrrell J, *et al*. Red blood cell distribution width: Genetic evidence for aging pathways in 116,666 volunteers. PLoS ONE 2017;12(9):e0185083.
9. Inuzuka R, Abe J. Red Blood Cell Distribution Width as a Link Between Ineffective Erythropoiesis and Chronic Inflammation in Heart Failure. Circ J 2015;79:3-4.
10. Salvagno GL, Sanchis-Gomar F, Picanza A, Lippi G. Red blood cell distribution width: A simple parameter with multiple clinical applications. Crit Rev Clin Lab Sci 2015;52:86-105.
11. Kim J, Im KS, Choi CS, Park CH, Lee JI, Son KH, *et al*. The Association between Red Blood Cell Distribution Width and Sarcopenia in U.S. Adults. Scientific reports 2018;8:Article No. 11484.
12. Lippi G, Mattiuzzi C, Cervellin G. Learning more and spending less with neglected laboratory parameters: the paradigmatic case of red blood cell distribution width. Acta Biomed 2017;87:323-8.
13. Chen PC, Sung FC, Chien KL, Hsu HC, Su TC, Lee YT. Red blood cell distribution width and risk of cardiovascular events and mortality in a community cohort in Taiwan. Am J Epidemiol 2010;171:214-20.
14. Borne Y, Smith JG, Melander O, Engstrom G. Red cell distribution width in relation to incidence of coronary events and case fatality rates: a population-based cohort study. Heart 2014;100:1119-24.
15. Lippi G, Salvagno GL, Guidi GC. Red blood cell distribution width is significantly associated with aging and gender. Clin Chem Lab Med 2014; 52:e197-9.
16. Braun E, Domany E, Kenig Y, Mazor Y, Makhoul BF, Azzam ZS.. Elevated red cell distribution width predicts poor outcome in young patients with community acquired pneumonia. Crit Care 2011;15:R194.
17. Abdinur MA, Yong X. Progress in Red Blood Cell Distribution width And Cardiovascular Diseases. IOSR-JDMS 2016;15(9):128-31.
18. Evans TC, Jehle D. The red blood cell distribution width. J Emerg Med 1991;9:71-4.
19. Tefferi A, Hanson CA, Inwards DJ. How to interpret and pursue an abnormal complete blood cell count in adults. Mayo Clin Proc 2005;80:923-36.

How to cite this article:

Kuldeep singh *et al* (2019) 'To Study the Spectrum of Haematological Diseases in Patients with Increased Rdw', *International Journal of Current Advanced Research,* 08(06), pp. 19299-19302. DOI: http://dx.doi.org/10.24327/ijcar.2019.19302.3716

****